Number Nine's

9FX REALITY 332

Graphics Accelerator

Reference Guide

NUMBER NINE
VISUAL TECHNOLOGY

Contents

Introduction

Thank you for choosing a 9FX Reality™ 332, one of the world's most versatile graphics and multimedia accelerators.

This introduction:

- Describes how to use this guide

- Provides a general explanation of graphics accelerators

- Provides a brief introduction to Number Nine Visual Technology Corporation

- Identifies some of the features of the 9FX Reality 332 graphics accelerator.

How to Use this Guide

Use this Guide in combination with the *Installing and Getting Started* card to:

- Install the hardware and software for your Number Nine graphics accelerator

- Troubleshoot installation problems

- Obtain technical details about your Number Nine graphics accelerator

- Locate graphics-related information required by an application or another piece of hardware.

  For example, a new pre-press software package may utilize extensive color depths. For information on color depths available at different resolutions, see "Maximum Color Depths and Refresh Rates" in the Appendices of this Guide.

What Is a Graphics Accelerator?

A graphics accelerator is a combination of hardware and software that can be added to a computer to speed up the drawing and redrawing of visual data on your monitor and may allow you to view more colors at higher resolutions.

Without a separate graphics accelerator, this drawing and redrawing of graphics would be handled by the computer's CPU (central processing unit) and a video graphics adapter (VGA) that has no processing capability.

A graphics accelerator has its own processor, allowing it to perform many functions by itself, with only minimal input from the CPU. This results in an enormous performance gain for most common graphics operations, including opening and closing windows, filling objects with colors and patterns, line drawing, and transferring bitmaps and pixels.

A Little About Number Nine

Number Nine Visual Technology was the first company to produce graphics accelerators for personal computers. Since 1982, when we built our first graphics accelerator, we have continued to be a market leader in producing innovative, high-performance, easy-to-use graphics accelerators.

Number Nine products handle a wide variety of user needs. Whether you need to boost performance of word processing and spread-sheet programs, handle high-end desktop publishing programs, run compressed full-motion video clips, or display and render 3-dimensional (3D) objects, Number Nine has the appropriate graphics accelerator for your needs.

Features of the 9FX Reality 332

This section describes features of the high-performance 9FX Reality 332 graphics accelerator.

Don't let the technical details presented here intimidate you. You can fully and easily reap the benefits of these features without tackling a myriad of technical concepts.

Features of Number Nine's 9FX Reality 332 graphics accelerator include:

- Cutting-edge graphics and Windows acceleration

- 3-dimensional (3D) support for games, World Wide Web tools, and CAD applications

Supported 3D functions include: flat and Gouraud shading, texture mapping with perspective correction, double buffering, and a 16-bit Z-buffer.

- Support for the S3 Scenic Highway™, the new connectivity standard for multimedia, which ensures low-cost upgrade compatibility

  Extra multimedia options include the 9FX Plus MPEG 231 hardware MPEG decoder, which can easily be plugged onto the 9FX Reality 332 graphics accelerator card. For more information, contact Number Nine.

- Video playback with acceleration of up to 30 frames per second

  Video playback is maintained by the streams processor. No longer do you have to put up with postage size video clips. The Reality 332 lets you play your favorite video clips at full screen at full acceleration.

- Vertical refresh rates up to 150 Hz at lower resolutions, and up to 75 Hz at higher resolutions

- A single PCI slot solution

  The 9FX Reality 332 and optional 9FX Plus MPEG 231 module occupy a single PCI expansion slot. You get 2D and 3D graphics acceleration, video scaling, and hardware MPEG playback on a single plug-and-play PCI device.

- Easy installation

  The 9FX Reality 332 is a Plug & Play compatible device. Simply install the graphics accelerator card and run the Setup program included on the Number Nine CD-ROM or diskette.

- Advanced texture mapping features, including several lighting models and filtering and sampling modes to render realistic high-quality interactive scenes.

- Graphics resolutions up to 1280 x 1024 and virtual resolutions up to 1600 x 600 allowing a larger desktop size, greater productivity, and up to 16.7 million colors of photo-realistic graphics.

Installation Information

Use the information in this section along with the *Installing and Getting Started* card to determine:

- The steps involved in installing your new graphics accelerator

- System requirements of your new graphics accelerator

- The key parts of your Number Nine accelerator card

- Required hardware settings, such as jumper switches

- How to install the software drivers you need

- How to troubleshoot problems

Overview of Installation Steps

1. Install hardware as described on the *Installing and Getting Started* Card.

2. Install Software:

   - Windows 3.1 users: Install HawkEye. Software drivers for your operating system are automatically installed with HawkEye. Instructions are provided on the *Installing and Getting Started* Card.

   - Windows 95 users: Install software drivers for Windows 95. Then install HawkEye. Instructions are provided on the *Installing and Getting Started* Card.

   - Users of other supported operating systems and DOS-based CAD programs: Install the appropriate software drivers using the instructions available in this *Guide*. HawkEye is unavailable.

System Requirements

To install the 9FX Reality 332 graphics accelerator, your system must include:

- A PCI-based 486, Pentium, or Pentium Pro computer system.

- A non-interlaced, variable-frequency multi-sync or multi-scan monitor.

- One of the following operating systems: Windows 95, Windows 3.1, and Windows NT.

- Up to 3 megabytes of disk space on your hard disk for the software required to work with your operating system.

Key Parts of Your Accelerator Card

The following illustration displays a 9FX Reality 332 graphics accelerator populated with 2 megabytes of Extended Data Out (EDO) DRAM.

Your card may look different, depending on your card's memory configuration.

mounting bracket

VGA passthrough and Scenic Highway connector

memory

monitor connector

BIOS

edge connector (PCI-based)

S3d™ ViRGE™ graphics accelerator chip
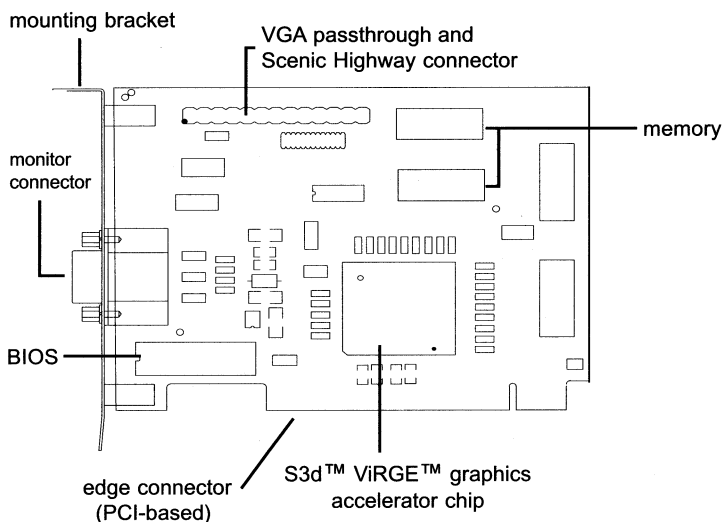
Required Hardware Settings

It is not necessary to set any hardware switches on the 9FX Reality 332 accelerator card.

Installing Software Drivers

The graphics accelerator card must be installed before you install the software drivers. (See the *Installing and Getting Started* card.)

Software drivers may be located on CD-ROM or on diskettes. If the driver you're looking for is not available, check our World Wide Web Home Page or our BBS site. (For information on how to contact Number Nine, see the Appendices of this *Guide*.)

If your graphics accelerator software is located on CD-ROM and you do not have a CD-ROM drive, you can get them on diskette, or you can download them over the Internet or from Number Nine's Bulletin Board Service.

Moreover, Number Nine regularly updates software drivers so you can update your system to ensure optimum performance. For information about downloading software drivers, see the *Installing and Getting Started* card. To obtain software drivers on a diskette, return the Diskette Request postcard to Number Nine.

Your computer can operate without installing the software drivers. However, you cannot fully utilize the features of your new 9FX Reality 332 graphics accelerator until you install the drivers for your operating system.

Installing Drivers for Windows 3.1 and Windows 95

If you use Windows 95 or Windows 3.1, follow the instructions on the *Installing and Getting Started* card.

Installing Drivers for Windows NT

To install drivers for the Windows NT operating system:

1. Boot Windows NT in VGA mode.
2. From the Main Folder, open the **Control Panel**.
3. Select the **Display** icon.
4. Choose **Change Display Driver**.
5. Choose **Change**.
6. At the **Select Device** window, choose **Other**.

7. Browse to the CD-ROM drive location that contains the Windows NT drivers.

8. Highlight the software drivers you want to install, then choose **Install** and follow the instructions on the screen.

9. Select a desired resolution, color depth, and refresh rate for your monitor.

    For additional information, see your Windows NT documentation.

Troubleshooting Information

Windows 95 and Direct X

If you install an application that uses Direct X after installing the 9FX Reality 332 graphics accelerator, Windows 95 displays the following prompt:

"Setup has detected video drivers that have not been tested with Direct X. Do you want to replace these drivers?"

- Answer **NO**. Otherwise, Windows 95 installs a generic software driver that will cause Direct X to function correctly, but HawkEye and high resolution modes will be unavailable to you. (Direct X will also function correctly with Number Nine's software drivers.)

- If you answered YES to this question, HawkEye and high-resolution modes will be unavailable to you. To switch to the software drivers supplied with your Number Nine graphics accelerator:

    1. Access the Windows 95 **Control Panel**:

        From the Start button, choose **Settings**, then **Control Panel**.

    2. From the Control Panel, choose **Display**.

    3. From Display Properties, choose the **Settings** page.

    4. From the Settings page, select the **Change Display Type** button.

    5. In the Adapter Type box, choose **Change**, then select the Number Nine driver.

Memory Addresses

As with all VGA-compatible adapters, the 9FX Reality 332 graphics accelerator uses memory in the A000-C7FF address segment. Some third-party memory managers may also want to use this address segment.

As a precautionary measure, DOS users may want to add an exclusion statement to their CONFIG.SYS file that prohibits memory managers from using the address segment used by VGA adapters. For more information, see the documentation for your memory manager.

If you use EMM386.EXE as your memory manager with DOS and Windows 3.1, add the following exclusion statement to the [386Enh] section of your SYSTEM.INI file:

EMMEXCLUDE=A000-C7FF

Monitor Preference Settings

Most new monitors have a built-in memory chip that stores your settings for brightness, contrast, shape, and size of the screen.

If your monitor doesn't have the built-in memory chip, you'll need to reset your preferences each time you switch between DOS and Windows or whenever you change resolution or refresh rate.

Typically, monitors with the built-in memory chip use digitally-controlled buttons. Ones without the built-in memory chip use dials or knobs to make adjustments.

Monitor Behaviors at Unsupported Resolutions

Changing to a resolution that is not supported by the monitor will cause an OUT OF SYNC image. This may appear as anything from horizontal lines on the screen to a black screen with a squealing noise from the monitor.

Long-term use of unsupported resolutions will cause damage to the monitor. For more information, consult the documentation for your monitor.

Note: In general, higher resolutions require higher refresh rates to prevent noticeable screen flicker.

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Monitor Tips

For any Number Nine graphics accelerator card, a multi-frequency, non-interlaced monitor is recommended.

Horizontal Frequency Ranges

Desired Resolution at 60 Hz Refresh rate	Minimum Horizontal Frequency Range Required
640 x 480	31.5 kHz
800 x 600	31.5-38 kHz
1024 x 768	31.5-49 kHz
1152 x 864	31.5-55 kHz
1280 x 1024	31.5-64 kHz

Desired Resolution at 75 Hz Refresh rate	Minimum Horizontal Frequency Range Required
640 x 480	38 kHz
800 x 600	47 kHz
1024 x 768	60 kHz
1152 x 864	68 kHz
1280 x 1024	80 kHz

Monitor Switch Settings

Switch	Recommended Setting
RGB video input	75 ohms
HSYNC and VSYNC	EXT 75 ohms
Analog/Digital input (if present)	Analog or BNC

Color Coding for BNC Monitor Cables

If you have a BNC monitor:

Hook this video cable	To this input connection on the monitor
Red	Red
Green	Green
Blue	Blue
Gray or White	HSYNC (horizontal sync)
Black	VSYNC (vertical sync)

Popular Screen Resolutions

The following table provides popular resolution settings for different monitor sizes. Because optimum resolution is subjective, the information in this table should not be viewed as required—or even recommended—settings.

Monitor Size	Popular Resolutions
14"	640 x 480
15"	640 x 480 and 800 x 600
17"	800 x 600 and 1024 x 768
20"	1024 x 768 and 1280 x 1024
21"	1024 x 768 and 1280 x 1024

Things to keep in mind:

- In general, higher resolutions are preferred to smaller resolutions, because they produce sharper images. However, as the resolution gets higher (1280 x 1024, for example) images appear smaller and farther away, and the view of your desktop area expands. More information is visible.

- As the resolution gets lower (640 x 480, for example), images appear larger and closer, and you see less of your desktop area. Less information is visible.

- Larger monitors can usually display higher resolutions than smaller ones.

- In general, higher resolutions require higher refresh rates to prevent noticeable screen flicker.

- As pixel size decreases with higher resolutions, the monitor's dot pitch becomes more important. For example, a .26 dot pitch displays a cleaner image at high resolutions than a monitor with a .31 dot pitch.

Maximum Color Depths & Refresh Rates

The maximum number of colors and the maximum vertical refresh rates available to you depends on these variables:

- The amount and type of memory on your graphics accelerator card

- The resolution you use

Maximum Colors and Refresh Rates

The following table displays the maximum colors and refresh rates available at different resolutions on a 9FX Reality 332 graphics card with 2 Megabytes of EDO DRAM.

Resolution	Maximum Colors	Maximum Refresh Rate
640 x 480	16M	150 Hz
800 x 600	16M	125 Hz
1024 x 768	65K	120 Hz
1152 x 864	256	90 Hz
1280 x 1024	256	75 Hz

Note that:

- Generally, flicker is not visible to the human eye at refresh rates of 75 Hz and above.

Electrical and Environmental Specifications

Electrical

Operating Voltage: 5V +/- 10%

Current Rating in amps: Typ. 1.0 Amps, Max. 1.2 Amps
Current Rating in amps with the 9FX Plus MPEG 231 attached:
Typ. 1.1 Amps, Max. 1.4 Amps

Video

The video follows the RS-343 standard, with no sync on RGB, and no blanking Pedestal. Black or blank: 0.0V; White: 0.700 +/-0.02V.

Mechanical

Technology: Thick NEMA grade FR-4 glass epoxy, natural green color

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Board physical dimensions in inches: 5.0 x 4.0 x .062 +/- .007
(length x height x thickness). In centimeters: 12.7 x 10.16 x 0.15748
+/- 0.01778.

Environmental

Minimum/Maximum ambient operating temperatures: 0 - 60 Deg. C

Minimum/Maximum storage temperatures: -40 to 75 Deg. C

Maximum altitude for operation: 3,000 meters

Maximum altitude for transport: 12,000 meters

Operating humidity: 20-80% relative humidity (non-condensing)

Storage humidity: 5-95% relative humidity (non-condensing)

Supported VESA and VGA Modes

VESA and VGA modes are accessed when you are in the DOS
environment. The 9FX Reality 332 graphics accelerator provides
built-in support for most VESA and all VGA modes.

The following tables identify VESA and VGA modes supported by the
9FX Reality 332 graphics accelerator.

Note: If you use a DOS application that requires extended modes,
select them from the application.

Supported VGA Modes (2 MB Cards)

MODE #			
Graphics	*Text*	*Resolution*	*Color*
	0	40 x 25	16
	1	40 x 25	16
	2	80 x 25	16
	3	80 x 25	16
4		320 x 200	4
5		320 x 200	4
6		640 x 200	4
	7	80 x 25	Mono
Dh		320 x 200	16
Eh		640 x 200	16
Fh		640 x 350	Mono
10h		640 x 350	16
11h		640 x 480	16
13h		640 x 200	256

Supported VESA Modes (2 MB Cards)

Graphics	Text	Resolution	Color
100h		640 x 400	256
101h		640 x 480	256
102h		800 x 600	16 *
103h		800 x 600	256
104h		1024 x 768	16 *
105h		1024 x 768	256
106h		1280 x 1024	16 *
107h		1280 x 1024	256
	109h	132 x 25 *	
	10Ah	132 x 43 *	
10Dh		320 x 200	32K *
10Eh		320 x 200	16M *
10Fh		320 x 200	16M *
110h		640 x 480	32K *
111h		640 x 480	65K
112h		640 x 480	16M
113h		800 x 600	32K *
114h		800 x 600	65K
115h		800 x 600	16M
116h		1024 x 768	32K
117h		1024 x 768	65K
124h		1152 x 864	256 *
208h		1280 x 1024 packed	16M *
215h		512 x 384	256 *
216h		512 x 384	32K *
217h		512 x 384	65K *
218h		512 x 384	16M *

* May not be available with your operating system

Graphics Terminology

3D acceleration

The ability to view applications and games that create or support 3-dimensional objects and images at greater redraw rates and enhanced image quality for more realistic experiences.

Bandwidth

A measure of the amount of data a device can handle in one second.

Color Depth

The amount of memory available to store color information for a single pixel.

Frame rate

The number of frames of an animation or movie which are displayed every second. The higher the frame rate, the smoother the output.

Horizontal refresh rate

The number of times per second the monitor scans from the leftmost edge of the screen to the right edge, expressed in kiloHertz (kHz).

Interlaced monitor

(Not supported with Number Nine graphic accelerators.) Interlaced monitors draw half of the lines on the screen each time the screen is updated. Screen flicker may be noticeable.

Motherboard

The main component of the computer, containing the central processing unit, memory slots, expansion bus slots, a keyboard connector, and other possible components.

MPEG

Created by the Motion Pictures Expert Group, MPEG is a specification for compressing and decompressing animation or "movie" files, which are typically very large.

Non-interlaced monitor

All of the lines on the screen are drawn each time the screen is updated, resulting in less screen flicker.

PCI

Peripheral Components Interconnect. A 64-bit bus standard designed for the Pentium, currently implemented as 32 bits.

Plug and Play

An industry-wide specification that makes it easy to install new hardware. Plug and Play enables the computer to correctly identify hardware components and ensure that different cards don't have conflicting requirements. To fully implement Plug and Play, both the operating system and the BIOS on the motherboard must support it, and the hardware card must identify itself to the system.

Refresh rate

The speed at which the monitor display is redrawn. The higher the refresh rate, the better the image.

Resolution

Usually specified by the number of pixels in a single line, and the number of lines in a single screen. A resolution of 640 x 480 is less than one-quarter the resolution of 1280 x 1024.

Software Drivers (Device Drivers)

The software that lets a device, such as a graphics accelerator card, interact with a particular computer system.

Video playback

The capability to view digitally encoded videoclips that are typically stored on CD-ROMs. The most popular file formats are .AVI, .MPG, and .MOV.

VGA

Video Graphics Array. A standard that supports resolutions up to 640 x 480 at 16 colors.

VESA

Video Electronics Standards Association. This group produces standards for a variety of video-related issues, including minimum screen refresh rates at various resolutions.

Vertical refresh rate

The number of times the video card refreshes the entire screen in one second, expressed in Hertz (Hz).

VLB

VESA Local Bus. A 32-bit bus originally designed to provide higher bandwidth for video cards. Optimized for 486 systems.

VRAM

Video Random Access Memory (also called Video RAM). A specialized version of Dynamic RAM, equipped with a second data port that

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allows the monitor display to be updated (refreshed) without impacting system performance.

Z buffering

A method of removing hidden surfaces by storing a depth value ("Z value") with each rendered pixel. When a new pixel is rendered, its depth is compared with the stored depth in the buffer. The new pixel is written only if its depth value is less than that stored. This enables accurate representation of non-intersecting and intersecting objects.

Contacting Number Nine

World Wide Web Home Page	http://www.nine.com	
FTP Internet Site	ftp.nine.com	
Bulletin Board System (BBS)	USA	EUROPE
Dial:	(617) 862-7502	+ 49 89 614 491 66
Baud:	Up to 28,800	up to 14,400
Compression:	HST, v.32 and v.42	HST, v.32 and v.42
Modem Setup:	8 data bits, 1 stop bit, no parity	8 data bits, 1 stop bit, no parity

CompuServe Address	**Go Nine** or **Go Gravenc**
Number Nine Customer Service	USA Telephone (617) 674-8595 from 8 a.m. to 6 p.m. Eastern Time
	Europe + 49 89 614 491 0
U.S.A. Address	Number Nine Visual Technology 18 Hartwell Avenue Lexington, MA 02173 USA
U.S.A. Fax Number	(617) 674-2919
European Address	Number Nine Visual Technology, GmbH Inselkammerstr.10 82008 Unterhaching b. Munchen Germany
European Fax Number	+49-89-61-44-91 99

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